

FRONTEX RESEARCH GLOSSARY



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The purpose of this glossary is to deliver a common understanding of frequently used terms, concepts and phrases when reading, interpreting, and evaluating technological and environmental research. It is intended as an aid for researchers. **Bold** text indicates a term defined in this glossary and is used with the meanings defined in most modern research studies. It is recognised that there are different schools of thought on research, but the terms defined here clarify those being used in Frontex research studies. For further details, researchers should consult the Frontex Research and Innovation Unit.



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A

Abduction

A form of reasoning with strong ties with **inductive reasoning** that grounds social scientific accounts of social worlds in the perspectives and meanings of participants in those social worlds.

Accuracy

A term used in **survey research** to refer to the match between the target **population** and the **sample**.

Action research

An approach in which a researcher and a client collaborate in the diagnosis of a problem and in the development of a solution based on the diagnosis.

Ad libitum sampling

A sampling approach in **structured observation** whereby whatever is happening at the moment that observation is due to occur is recorded.

Aggregate

A total created from smaller **units of analysis**. For instance, the **population** of a county is an **aggregate** of the populations of the cities, rural areas, etc. that comprise the county. As a verb, it refers to total **data** from smaller units into a large unit.

Anonymity

A condition in which no one, including the researcher, knows the identities of research participants.

Asynchronous online interview or focus group

Online **interviews** may be asynchronous or **synchronous**. In the case of the former, the transactions between participants are not in real time, so that there may be long spaces of time between interviewers' questions and participants' replies, and, in the case of focus groups, between participants' contributions to the discussion.

B

Baseline

An initial set of observations or **data** used for comparison or to monitor and assess change, progress and effectiveness during and after an activvity is completed.

Basic research

Research carried out to discover something simply for the sake of knowledge to improve the understanding of the world, and for academic rather than commercial purposes.

Behaviour sampling

A sampling approach in **structured observation** whereby an entire group is watched and the observer records who was involved in a particular kind of behaviour.

Beliefs

Ideas, doctrines, tenets, etc. that are accepted as true on grounds which are not immediately susceptible to rigorous proof.

Bell curve

A frequency **distribution** statistics. **Normal distribution** is shaped like a bell.

Benchmarking

Systematically measuring and comparing the operations and outcomes of organisations, systems, processes, etc. against agreed upon 'best-in-class' frames of reference.

Bias

A loss of balance and **accuracy** in the use of research methods. It can appear in **research** via the **sampling frame**, **random sampling**, or **non-response**. It can also occur at other stages in research, such as while interviewing, in the design of questions, or in the way **data** are analysed and presented. Bias means that the research findings will not be representative of, or generalisable to, a wider population.

Bibliography

A list of all sources of information consulted for the study, some of which may not have been cited within the body of the publication.

Bivariate analysis

The examination of the **relationship** between two **variables**, as in **contingency tables** or **correlation**.

Briefing note

A report which seeks to summarise a much larger issue — be it a report, topic, synthesis or body of evidence. Briefing notes adopt various different styles, and are intended primarily to offer the 'big picture' for those interested in specific or more detailed knowledge.

C

Caqdas

An abbreviation of computer-assisted (or -aided) qualitative data analysis.

Case study

A **research design** that entails the detailed and intensive analysis of a single case. The term is sometimes extended to include the study of just two or three cases for comparative purposes.

Category

In **grounded theory**, a category occupies a space between a researcher's initial theoretical reflections on and understanding of his or her **data** and a **concept**, which is viewed as a higher level of abstraction. Thus, a category has an intermediate position in terms of abstraction between **coding** and a **theory**.

Causal hypothesis

A statement hypothesising that the **independent variable** affects the **dependent variable** in some way. See **hypothesis**.

Causality

A concern with establishing causal connections between **variables**, rather than mere **relationships** between them.

Central tendency

Any way of describing or characterising typical, average, or common values in some **distribution**.

Census

A **sample** that includes every member of the targeted **population** of the **research**.

Chi-square analysis

A common non-parametric statistical test which compares an expected proportion or ratio to an actual proportion or ratio.

Claim

A statement, similar to a **hypothesis**, which is made in response to the **research question** and that is affirmed with evidence based on **research**.

Classification

Ordering of related phenomena into categories, groups, or systems according to characteristics or attributes.

Code, coding

In **quantitative research**, codes act as tags that are placed on **data** about people or other **units of analysis**. The aim is to assign the data relating to each **variable** to groups, each of which is considered to be a **category** of the variable in question. Numbers are then assigned to each category to allow the information to be processed by the computer. In **qualitative research**, coding is the process.

Comparative design

A **research design** that entails the comparison of two or more cases in order to illuminate existing **theory** or generate theoretical insights as a result of contrasting findings uncovered through the comparison.

Closed system

A system that is unaffected by external factors or the environment as it cannot interact or be influenced by them.

Cluster analysis

A method of **statistical analysis** where **data** that share a common trait are grouped together. The data is collected in a way that allows the data collector to group data according to certain characteristics.

Cohort analysis

Group-by-group analytic treatment of individuals having a statistical factor in common to each group. Group members share a particular characteristic (e.g. specific nationality) or a common experience (e.g. being a victim of THB ([1])).

Concealment

A situation where some information about the project is kept hidden from the participants or respondents.

Concept

A name or label given to a specific phenomenon, which is easily recognisable and distinguishable.

Confidentiality

A condition in which no one except the researcher(s) knows the identities of the participants in a study. It refers to the treatment of information that a participant has disclosed to the researcher in a relationship of trust and with the expectation that it will not be revealed to others in ways that violate the original consent agreement, unless permission is granted by the participant.

Confounding variable

An unforeseen, and unaccounted-for **variable** that jeopardises **reliability** and **validity** of an experiment's outcome.

Constant

An attribute in terms of which cases do not differ. Compare with **variable**.

Construct

Refers to any of the following: something that exists theoretically but is not directly observable; a **concept** constructed for describing relations among phenomena or for other **research** purposes; or, a theoretical definition in which concepts are defined in terms of other concepts. For example, intelligence cannot be directly observed or measured, it is a construct.

Content analysis

The systematic, objective, and quantitative description of the manifest or latent content of print or non-print communications.

Context sensitivity

Awareness by a qualitative researcher of factors such as values and **beliefs** that influence cultural behaviours.

Contingency table

A table, comprising rows and columns that shows the **relationship** between two **variables**. Usually, at least one of the variables is a **nominal variable**. Each cell in the table shows the frequency of occurrence of that intersection of categories of each of the two variables and usually a percentage.

Continuous variable

A **variable** that may have fractional values, e.g. height, weight and time.

Correlation

A common **statistical analysis**, usually abbreviated as 'r', which measures the degree of **relationship** between pairs of **interval variables** in a **sample**. The **range** of **correlation** is from – 1.00 to zero to + 1.00. Also, a non-cause and effect **relationship** between two **variables**.

Cost–benefit analysis

An analysis that explores how to reach the desired goal at the lowest cost or in the most efficient manner.

Cramér's V

A method for assessing the strength of the **relationship** between two **variables**, at least one of which must have more than two categories.

Credibility

A researcher's ability to demonstrate that the **object** of a study is accurately identified and described based on the way in which the study was conducted.

Criterion-related validity

Used to demonstrate the **accuracy** of a measuring procedure by comparing it with another procedure which has been demonstrated to be valid; also referred to as instrumental validity. See **validity**.

Cross-sectional design

A **research design** that entails the collection of **data** on more than one case at a single point in time in order to collect a body of quantitative or quantifiable data in connection with two or more **variables** (usually many more than two), which are then examined to detect patterns of association.

D

Data

Factual information (as **measurements** or statistics) used as a basis for reasoning, discussion or calculation.

Data mining

The process of analysing **data** from different perspectives and summarising it into useful information, often to discover patterns and/or systematic **relationships** among **variables**.

Data quality

This is the degree to which the collected **data** (results of **measurement** or observation) meet the standards of quality to be considered valid (trustworthy) and reliable (dependable).

Deductive reasoning

A form of reasoning in which conclusions are formulated about particulars from general or universal premises.

Dependability

Being able to account for changes in the design of the study and the changing conditions surrounding what was studied.

Dependent variable

A **variable** that varies due, at least in part, to the impact of the **independent variable**. In other words, its value 'depends' on the value of the independent variable.

Descriptive studies

A study where the researcher provides a description of their observations, findings, results of data analyses, what people said during **interviews**, etc. of a phenomenon under study.

Design flexibility

A quality of an observational study that allows researchers to pursue inquiries on new topics or questions that emerge from initial **research**.

Deviation

The distance between the **mean** and a particular data point in a given **distribution of values**.

Dichotomous variable

A **variable** with just two categories.

Discourse community

A community of scholars and researchers in a given field who respond to and communicate to each other through published articles in the community's journals and presentations at conventions. All members of the discourse community adhere to certain conventions for the presentation of their **theories** and **research**.

Discrete variable

A **variable** that is measured solely in whole units, such as, gender and number of IBCs ([2]).

Disruptive technology

A specific technology that can fundamentally change not only established technologies but also the rules and business models of a given market, and often business and society overall.

Distribution of values

A term used to refer to the entire **data** relating to a **variable**. Thus, the ages of members of a **sample** represent the distribution of values for that variable for that sample.

Distribution

The **range** of values of a particular **variable**.

Dynamic systems

Observational **qualitative research** is not concerned with having straightforward, right or wrong answers. Change in a study is common because the researcher is not concerned with finding only one answer.



E

Ecological fallacy

The error of assuming that inferences about individuals can be made from findings relating to **aggregate data**. See **fallacy**.

Ecological validity

A concern with the question of whether social scientific findings are applicable to people's natural social settings. See **validity**.

Effect size

The amount of change in a **dependent variable** that can be attributed to manipulations of the **independent variable**. A large effect size exists when the value of the dependent variable is strongly influenced by the independent variable. It is the mean difference on a **variable** between experimental and control groups divided by the **standard deviation** on that variable of the pooled groups or of the control group alone.

Empirical research

The process of developing systematised knowledge gained from observations that are formulated to support insights and generalisations about the phenomena being researched.

Epistemology

Concerns knowledge construction; asks what constitutes knowledge and how knowledge is validated.

Eta

A test of the strength of the **relationship** between two **variables**. The **independent variable** must be a **nominal variable** and the **dependent variable** must be an **interval variable** or **ratio variable**. The resulting level of **correlation** will always be positive.

Evaluation research

Research carried out to gauge the relevance, suitability and effectiveness of a specific (public relations or other) campaign or programme, being implemented. It is also known as programme evaluation.

Expectancy effect

Any unconscious or conscious cues that convey to the participant in a study how the researcher wants them to respond. Expecting someone to behave in a particular way has been shown to promote the expected behaviour. Expectancy effects can be minimised by using standardised interactions with subjects, automated data-gathering methods, and double blind protocols.

Experimental research

A researcher working within this **methodology** creates an environment in which to observe and interpret the results of a **research question**. A key element in experimental research is that participants in a study are randomly assigned to groups. In an attempt to create a causal model (i.e. to discover the causal origin of a particular phenomenon), groups are treated differently and **measurements** are conducted to determine if different treatments appear to lead to different effects.

Explanatory studies

The researcher provides a causal explanation of ‘why it is so?’ or a functional explanation of ‘how is it so?’ for a phenomenon under study.

External validity

The extent to which the results of a study are generalisable or transferable. See **validity**.

F

Face validity

A concern with whether an **indicator** appears to reflect the content of the **concept** in question.

Facilitator

See **moderator**.

Factor analysis

A statistical test that explores **relationships** among **data**. The test explores which **variables** in a data set are most related to each other. In a carefully constructed survey, for example, factor analysis can yield information on patterns of responses, not simply data on a single response. Larger tendencies may then be interpreted, indicating behaviour trends rather than simply responses to specific questions.

Fallacy

Wrong assumption made in **research**.

Frequency table

A table that displays the number and/or percentage of units (e.g. people) in different categories of a **variable**.

Field stimulation

A study in which the researcher directly intervenes in and/or manipulates a natural setting in order to observe what happens as a consequence of that intervention.

Focus groups

Small, roundtable discussion groups charged with examining specific topics or problems, including possible options or solutions. Focus groups usually consist of 4-12 participants, guided by **moderators** to keep the discussion flowing and to collect and report the results.

Forecast

The process of making predictions about the future, based on past and present data and the analysis of trends.

Foresight

Foresight involves systematic attempts to look into the future of science, technology, society and the economy, and their interactions, in order to promote specific strategic benefits. It is expected to bring awareness of long-term challenges and opportunities into more immediate decision-making. It acknowledges the fact that the future is uncertain and tries to prepare decision-makers for how the future may change. The main difference with regard to forecasting is that foresight does not predict the future, but rather explores the range of plausible futures that may emerge. See **technology foresight**.

Framework

The structure and support that may be used as both the launching point and the ongoing guidelines for investigating a research problem.

G

Gamification

The application of typical elements of game playing (e.g. point scoring, competition with others, rules of play) to other areas of activity to encourage engagement.

Generalisability

The extent to which research findings and conclusions conducted on a specific study to groups or situations can be applied to the population at large.

Grounded theory

Practice of developing other theories that emerge from observing a group. Theories are grounded in the group's observable experiences, but researchers add their own insight into why those experiences exist.



H

Heuristic value

Indicates if a **theory** can generate **research** and take our knowledge further.

Holistic perspective

Taking almost every action or communication of the whole phenomenon of a certain community or culture into account in **research**.

Hypothesis

A formal statement made about the predicted **relationship** between **variables** in a piece of **research**, which is directly tested by the researcher. Generally linked to **deductive reasoning**.



I

Independent variable

The conditions of an experiment that are systematically manipulated by the researcher. A **variable** that is not impacted by the **dependent variable**, and that itself impacts the dependent variable.

Indicator

A measure that is employed to refer to a **concept** when no direct measure is available.

Inductive reasoning

A form of reasoning in which a generalised conclusion is formulated from particular instances.

Inductive analysis

A form of analysis based on **inductive reasoning**; a researcher using inductive analysis starts with answers, but formulates questions throughout the research process.

Innovation

Identification, assessment and evaluation of products and services, tools and processes, at the level of operational prototype or above (**TRL** 6 and above).

Internal reliability

The degree to which the **indicators** that make up a **scale** are consistent. *See* **reliability**.

Internal consistency

The extent to which all questions or items assess the same characteristic, skill, or quality.

Interval variable

A **variable** where the distances between the categories are identical across its **range** of **categories**.

Intervening variable

A **variable** that is affected by another variable and that in turn has a causal impact on another variable. Taking an intervening variable into account often facilitates the understanding of the **relationship** between two variables.

Interviews

A tool in which a researcher asks questions of participants; interviews are often audio- or video-taped for later transcription and analysis.

L

Likert scale

Also known as the summated ratings approach, a Likert scale has several statements that address the **concept** under examination with an interval scale, prepared by the researcher. The numbers given by a respondent to each of the statements on the interval scale are added to obtain a composite score.

Linear relationship

A situation where one or more of the **dependent variables** will change when the **independent variable** changes.

Literature review

An examination of the existing research publications on the topic area of a new study, to discuss their theorising, research designs, data collection methods, findings, strengths, limitations and contexts as relevant to the new one. This also includes the researcher's own views and observations, and alternative explanations of the findings as to what other factors may have given rise to those findings.

Longitudinal study

A study that collects **data** from the same **population** (but different **samples**) at different points in time.



Margin of error

The acceptable **deviation** from the target or a specific value. The allowance for slight error or miscalculation or changing circumstances in a study.

Mean

The average score within a **distribution**.

Mean deviation

A measure of **variation** that indicates the average **deviation** of scores in a **distribution** from the **mean**: it is determined by averaging the absolute values of the deviations.

Measurement

Process of obtaining a numerical description of the extent to which persons, organisations, or things possess specified characteristics.

Median

The mid-point in a **distribution of values**.

Meta-analysis

An analysis combining the results of several studies that address a set of related **hypotheses**.

Metadata

Data that describes an item such as a dataset. Metadata labels a dataset with descriptive information such as author/creator, title, date, publisher, unique identifier and so on. Having metadata associated with a dataset enables the dataset to be found and cited. It provides other researchers with the information they require to understand the **data**. Metadata should comply with accepted international standards wherever possible.

Methodology

A **theory** of how **research** does and should proceed.

Methods

Systematic approaches to the conduct of an operation or process. It includes steps of procedure, application of techniques, systems of reasoning or analysis, and the modes of inquiry employed by a discipline.

Mixed-methods

A **research** approach that uses two or more **methods** from both the **quantitative** and **qualitative research**. It is also referred to as blended methods, combined methods or methodological **triangulation**.

Mode

The most frequent score in a **distribution**.

Modelling

The creation of a physical or computer analogy to understand a particular phenomenon. Modelling helps in estimating the relative magnitude of various factors involved in a phenomenon. A successful **model** can be shown to account for unexpected behaviour that has been observed to predict certain behaviours, which can then be tested experimentally, and to demonstrate that a given **theory** cannot account for certain phenomenon.

Model

Representation of objects, principles, processes, or ideas often used for imitation or emulation.

Moderated relationship

A **relationship** between two **variables** is said to be moderated when it holds for one **category** of a third variable but not for another category or other categories. See **relationship**.

Moderator

The person who guides the questioning of a **focus group**. Also called a **facilitator**.

Multi-method research

Research that uses more than one **paradigm**, methodological tool or data collection method in the same study to obtain a more holistic view.

Multiple-indicator measure

A measure that employs more than one **indicator** to measure a **concept**. See **indicator**.

Multivariate analysis

The examination of **relationships** between three or more **variables**.

N

Need assessment

An analysis that identifies potential problem areas, their severity and how they may be addressed.

Negative relationship

When the value of the **independent variable** increases, the value of the **dependent variable** decreases.

Nominal variable

A **variable** determined by **categories** which cannot be ordered, e.g. gender and colour.

Non-linear relationship

A situation where no predictable pattern or **relationship** seems to exist between the independent and **dependent variable** in the phenomenon.

Non-manipulable variable

A **variable** that cannot readily be manipulated either for practical or for ethical reasons and that therefore cannot be employed in an experiment.

Non-representative sample

A **sample** that does not include cases or individuals from all subgroups of the targeted **population**. Findings of such as study are not generalisable to the population. Please see **representative sample**.

Non-response rate

The percentage of the respondents that did not answer a specific question.

Non-scholarly sources

Newspapers, magazines, trade journals, websites and other sources examined for suitable articles and information for a research study.

Norm

The norm in statistics is the average or usual performance. For example, students usually complete their high school graduation requirements when they are 18 years old. Even though some students graduate when they are younger or older, the norm is that any given student will graduate when he or she is 18 years old.

Normal distribution

A normal frequency **distribution** representing the **probability** that a majority of randomly selected members of a population will fall within the middle of the distribution.

Null hypothesis

The proposition, to be tested statistically, that the experimental intervention has 'no effect', meaning that the treatment and control groups will not differ as a result of the intervention. Investigators usually hope that the **data** will demonstrate some effect from the intervention, thus allowing the investigator to reject the null hypothesis. See **hypothesis**.

NVivo

A **Caqdas** package that facilitates the management and analysis of **qualitative data**.



O

Object

The event, thing or phenomenon under study.

Official statistics

Statistics compiled by or on behalf of state agencies in the course of conducting their business.

Open system

A system that responds to and is affected by external factors or its environment.

Operational definition

The definition of a **concept** in terms of the operations to be carried out when measuring it.

Ordinal variable

A **variable** whose categories can be rank ordered (as in the case of **interval** and **ratio variables**), but the distances between the categories are not equal across the **range**.

Outlier

An extreme value in a **distribution of values**. If a **variable** has an extreme value — either very high or very low — the **mean** or the **range** will be distorted by it.

P

Panel study

A **longitudinal study** in which a group of individuals is interviewed at intervals over a period of time.

Paradigm

A paradigm is a way or framework of looking at something.

Parameter

A coefficient or value for the **population** that corresponds to a particular statistic from a **sample** and is often inferred from the sample.

Pearson's r

A measure of the strength and direction of the **relationship** between two **interval**/**ratio variables**.

Pattern coding

A method of analysing **qualitative data** using a systematic set of procedures to **code** data into named **categories** to discover patterns between them.

Phi

A method for assessing the strength of the **relationship** between two **dichotomous variables**.

Peer-Review

The process in which the author of a report, article, or other type of publication submits his or her work to experts in the field for critical evaluation, usually prior to publication. This is standard procedure in publishing scholarly research.

Phenomenology

A **qualitative research** approach concerned with understanding certain group behaviours from that group's point of view.

Philosophy

Critical examination of the grounds for fundamental beliefs and analysis of the basic **concepts**, doctrines, or practices that express such beliefs.

Policy

Governing principles that serve as guidelines or rules for decision-making and action in a given area.

Policy analysis

Systematic study of the nature, **rationale**, cost, impact, effectiveness, implications, etc. of existing or alternative policies, using the theories and methodologies of relevant social science disciplines.

Population

The target group under investigation. The population is the entire set under consideration. **Samples** are drawn from populations.

Positive relationship

When the value of the **independent variable** increases, the value of the **dependent variable** also increases.

Predictive measurement

Use of tests, inventories, or other measures to determine or estimate future events, conditions, outcomes, or trends. See **measurement**.

Probability

The chance that a phenomenon will occur randomly. As a statistical measure, it is shown as p (the 'p' factor).

Process evaluation

A research method that determines if a programme or campaign was implemented as designed.



Q

Qualitative data

Data that is non-numerical and embedded in their context, e.g. responses to open-ended questions in a survey; opinions of people.

Qualitative research

Empirical research in which the researcher explores **relationships** using textual, rather than **quantitative data**. Observation, and ethnography are considered forms of qualitative research. Results are not usually considered generalisable, but are often transferable.

Quantitative data

Data that is numerical and can be 'counted', e.g. responses to closed-ended questions in a survey.

Quantitative research

Empirical research in which the researcher explores **relationships** using numerical **data**. Survey is generally considered a form of quantitative research. Results can often be generalised, though this is not always the case.

Quasi-experiment

Similar to true experiments. Have subjects, treatment, etc. but uses non-randomised groups. Incorporates interpretation and **transferability** in order to compensate for lack of control of **variables**.

Questionnaire

Structured sets of questions on specified subjects that are used to gather information, attitudes, or opinions.

Quixotic reliability

Refers to the situation where a single manner of observation consistently, yet erroneously, yields the same result. See **reliability**.

R

Random error

Errors in the findings caused by unexpected, uncontrolled and unknown factors.

Random sample

A population **sample** selected strictly by chance, yielding no discernible pattern beyond chance. The sample is said to be random because there is no regular or discernible pattern or order. Random sample selection is used under the assumption that sufficiently large samples assigned randomly will exhibit a **distribution** comparable to that of the population from which the sample is drawn. The random assignment of participants increases the **probability** that differences observed between participant groups are the result of the experimental intervention.

Range

The difference between the highest and lowest scores in a **distribution**.

Rationale

The researcher's explanation as to why the study is important, what purpose it serves and what will be its outcome to society or the academic field.

Ratio variable

An **interval variable** with a true zero point.

Reflexivity

A term used in research methodology to refer to a reflectiveness among social researchers about the implications for the knowledge of the social world they generate of their methods, values, biases, decisions, and mere presence in the very situations they investigate.

Relational hypothesis

Determines if **relationship** exists between a set of **variables**. See **hypothesis**.

Relationship

An association between two **variables** whereby the **variation** in one variable coincides with variation in another variable. See also **negative relationship** and **positive relationship**.

Reliability

The degree to which a measure yields consistent results. If the measuring instrument (e.g. survey) is reliable, then administering it to similar groups would yield similar results. Reliability is a prerequisite for **validity**. An unreliable **indicator** cannot produce trustworthy results.

Replication, replicability

The degree to which the results of a study can be reproduced. See also **internal reliability**.

Representative sample

Sample in which the participants closely match the characteristics of the **population**, and thus, all segments of the population are represented in the sample. A representative sample allows results to be generalised from the sample to the population.

Research

Investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws.

Research questions

Used when the researcher is not sure what to look for. It indicates the general areas of the phenomenon under study. **Data** is then collected to examine the **research questions**. Generally linked to **inductive reasoning**.

Research strategy

A term used in this book to refer to a general orientation to the conduct of social research. See **quantitative research** and **qualitative research**.

Research summary

A report which provides a summary of a larger research report. It usually mirrors the typical format of a piece of **research** (e.g. introduction, methods, results, conclusions), but in an abridged format.

Response rate

In **survey research**, the actual percentage of **questionnaires** completed and returned.

Rigour

Degree to which research methods are scrupulously and meticulously carried out in order to recognise important influences occurring in an experimental study.

S

Sample

The **population** researched in a particular study. Usually, attempts are made to select a 'sample population' that is considered representative of groups of people to whom results will be generalised or transferred. In studies that use inferential statistics to analyse results or which are designed to be generalisable, sample size is critical, generally the larger the number in the sample, the higher the likelihood of a representative distribution of the population.

Sampling error

The degree to which the results from the **sample** deviate from those that would be obtained from the entire population, because of **random error** in the selection of respondent and the corresponding reduction in **reliability**.

Sampling frame

A listing that should include all those in the **population** to be sampled and exclude all those who are not in the population.

Saturation

A situation in which the analysis of **data** begins to reveal repetition and redundancy and when new data tend to confirm existing findings rather than expand upon them.

Scale

A term that is usually used interchangeably with index to refer to a **multiple-indicator measure** in which the score a person gives for each component **indicator** is used to provide a composite score for that person.

Scenario

A scenario is an illustration of visions of possible future or aspects of possible future. Scenarios are not predictions about the future but rather similar to simulations of some possible futures. They are used both as an exploratory method or a tool for decision-making, mainly to highlight the discontinuities from the present and to reveal the choices available and their potential consequences.

Science

Knowledge based on objective principles and systematic observation.

Secondary analysis

The analysis of **data** by researchers who will probably not have been involved in the collection of those data for purposes that may not have been envisaged by those responsible for the data collection. Secondary analysis may entail the analysis of either **quantitative data** or **qualitative data**.

Selective reduction

The central idea of **content analysis**. Text is reduced to **categories** consisting of a word, set of words or phrases, on which the researcher can focus. Specific words or patterns are indicative of the **research question** and determine levels of analysis and generalisation.

Semantic differential scales

Also known as the bipolar ratings system, it is used to measure respondents' attitudes towards a given issue, on a 1-7 interval **scale** with several opinions set up at extreme ends (e.g. useful-useless). A composite score is calculated for each respondent for this scale.

Semantics

The **relationship** between symbols and meaning in a linguistic system. Also, the cuing system that connects what is written in the text to what is stored in the reader's prior knowledge.

Sensitising concept

A term devised by Herbert Blumer to refer to a preference for treating a **concept** as a guide in an investigation, so that it points in a general way to what is relevant or important. This position contrasts with the idea of an **operational definition**, in which the meaning of a concept is fixed in advance of carrying out an investigation.

Serial effect

In **survey research**, a situation where questions may 'lead' participant responses through establishing a certain tone early in the **questionnaire**. The serial effect may accrue as several questions establish a pattern of response in the participant, biasing results.

Skewed distribution

Any **distribution** which is not normal, that is not symmetrical along the x-axis.

Snowball sample

Also known as referrals, the **sample** is made up of referrals from subjects who identified other suitable subjects, usually in areas that are difficult to conduct **research** in.

Social theories

Theories about the structure, organisation, and functioning of human societies.

Spearman's rho

A measure of the strength and direction of the **relationship** between two **ordinal variables**.

SPSS

Originally short for Statistical Package for the Social Sciences. SPSS is a widely used computer program that allows **quantitative data** to be managed and analysed.

Spurious relationship

A **relationship** between two **variables** is said to be spurious if it is being produced by the impact of a third variable (often referred to as a **confounding variable**) on each of the two variables that form the spurious relationship. When the third variable is controlled, the relationship disappears.

Standard deviation

A measure of **variation** that indicates the typical distance between the scores of a **distribution** and the **mean**. It can be used to indicate the proportion of **data** within certain **ranges** of scale values when the distribution conforms closely to the normal curve.

Standard error of the mean

An estimate of the amount that a sample mean is likely to differ from the population mean. See **mean**.

Statistical analysis

Application of statistical processes and **theory** to the compilation, presentation, discussion, and interpretation of numerical **data**.

Statistical bias

Characteristics of an experimental or sampling design, or the mathematical treatment of **data**, that systematically affects the results of a study so as to produce incorrect, unjustified, or inappropriate inferences or conclusions. See **bias**.

Statistical significance

The **probability** that the difference between the outcomes of the control and experimental group are great enough that it is unlikely due solely to chance. The probability that the **null hypothesis** can be rejected at a predetermined significance level (0.05 or 0.01).

Statistical tests

Researchers use statistical tests to make quantitative decisions about whether a study's **data** indicate a significant effect from the intervention and allow the researcher to reject the **null hypothesis** . That is, statistical tests show whether the differences between the outcomes of the control and experimental groups are great enough to be **statistically significant**. If differences are found to be statistically significant, it means that the **probability** that these differences occurred solely due to chance is relatively low. It is generally agreed that a significance value of 0.05 or less (i.e. there is a 95 % probability that the differences are real) sufficiently determines significance.

Structured observation

Often also called systematic observation, structured observation is a technique in which the researcher employs explicitly formulated rules for the observation and recording of behaviour. The rules inform observers about what they should look for and how they should record behaviour.

Subcultures

Ethnic, regional, economic, or social groups exhibiting characteristic patterns of behaviour sufficient to distinguish them from the larger society to which they belong.

Survey research

A **research** tool that includes at least one question which is either open-ended or closed-ended and employs an oral or written method for asking these questions. The goal of a survey is to gain specific information about either a specific group or a **representative sample** of a particular group. Results are typically used to understand the attitudes, beliefs, or knowledge of a particular group.

Synchronous online interview or focus group

Online **interviews** may be **asynchronous** or synchronous. In the case of the latter, the transactions between participants are in real time, so that there will be only brief time lapses between interviewers' questions and participants' replies, and, in the case of focus groups, between participants' contributions to the discussion.

Systematic review

A report which compiles and synthesises the best available **research** on a particular question in order to better understand a topic. More than a **literature review**, systematic reviews use a rigorous scientific method to obtain all relevant studies of high quality regarding a topic. As defined by the Campbell Collaboration, 'A systematic review must have: clear inclusion/exclusion criteria; an explicit search strategy; systematic **coding** and analysis of included studies; and **meta-analysis** (where possible)'.



Technological Research

Research focused on the identification and assessment of emerging technologies and their adaption to a form in which they can be operationalized (prototype). It supports areas of basic research where solutions begin to be translated into applied research and development. Technological research is applied to technology which has not surpassed a level 5 Technology Readiness Level (laboratory testing of integrated system).

Technology assessment

Technology assessment refers to efforts to investigate the impacts and implications of new technologies before they are widely adopted. It has been attempted in many arenas, with mixed success, hence many new technologies come 'on stream' without careful, in-depth assessment.

Technology foresight

Assessment of the future of technology and science with the aim to identify the technologies that will in a medium and long-term perspective have the most significant impact on society or specific stakeholder communities. It provides inputs for the formulation of technology policies and strategies that guide the development of the technological infrastructure. In addition, technology foresight provides support to **innovation**, and incentives and assistance to enterprises in the domain of technology management and technology transfer, leading to enhanced competitiveness and growth.

Tenacity

Long-held, taken-for-granted beliefs, which are difficult to change even when faced with contradictory evidence.

Testing

The act of gathering and processing information about individuals' ability, skill, understanding, or knowledge under controlled conditions.

Thematic analysis

A term used in connection with the analysis of **qualitative data** to refer to the extraction of key themes in one's **data**. It is a rather diffuse approach with few generally agreed principles for defining core theme in data.

Theory

A general explanation about a specific behaviour or set of events that is based on known principles and serves to organise related events in a meaningful way. A theory is not as specific as a **hypothesis**.

Theoretical saturation

In **grounded theory**, the point when emerging **concepts** have been fully explored and no new theoretical insights are being generated. See **saturation**.

Thick description

A rich and extensive set of details concerning **methodology** and context provided in a **research**.

Transferability

The ability to apply the results of **research** in one context to another similar context. Also, the extent to which a study invites readers to make connections between elements of the study and their own experiences.

Trend samples

Method of sampling different groups of people at different points in time from the same **population**.

Trend studies

A topic is re-examined or re-studied at different points in time using different **samples** of the same **populations** to observe if any trends exist.

Triangulation

A multi-method or pluralistic approach, using different **methods** in order to focus on the research topic from different viewpoints and to produce a multi-faceted set of **data**. Also used to check the **validity** of findings from any one method.

TRL

The TRL (Technology Readiness Level) scale is a means for measuring or indicating the maturity of a given technology. Thus it is used to define boundaries between different modes/stages of technological development. The TRL scale used within EU framework programmes spans over nine levels (see Annex 1).



U

Unit of analysis

The basic observable entity or phenomenon being analysed by a study and for which **data** are collected in the form of **variables**.



V

Validity

The degree to which a study accurately reflects or assesses the specific **concept** that the researcher is attempting to measure. A method can be reliable, consistently measuring the same thing, but not valid. See **reliability**.

Variable

Observable characteristics that vary among individuals.

Variance

A measure of **variation** within a **distribution**, determined by averaging the squared **deviations** from the **mean** of a distribution. It gives a measure of how the **data** distributes itself about the mean or expected value.

Variation

The dispersion of data points around the **mean** of a **distribution**.

Vision

In the context of future-oriented activities, a vision is an imagined representation or a shared picture of the (usually desired) future. The elaboration of shared strategic visions bringing together the viewpoints of the various actors could be the most important intangible output of a Foresight exercise. Developing these visions jointly can contribute to a shared sense of commitment and to the normative processes.



W

Weighted scores

Scores in which the components are modified by different multipliers to reflect their relative importance.

White paper

An authoritative report that often states the position about a social, political, or other subject, or a general explanation of an architecture, framework, or product technology written by a group of researchers. It is meant to help readers understand an issue, solve a problem, or make a decision.

Working theories

Theories that are at an exploratory stage and still under examination.

APPENDIX 1
Technology readiness levels - TRL[1]

TRL 1 — Basic principles observed

TRL 2 — Technology concept formulated

TRL 3 — Experimental proof of concept

TRL 4 — Technology validated in lab

TRL 5 — Technology validated in relevant environment (industrially relevant environment in the case of key enabling technologies)

TRL 6 — Technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies)

TRL 7 — System prototype demonstration in operational environment

TRL 8 — System complete and qualified

TRL 9 — Actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies; or in space)

1 Extract from Part 19 — Commission Decision C(2014)4995

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